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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/586,670

07/20/2006

Akira Takahashi

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25191

7590

01/13/2009

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EXAMINER

BHAT, NINA NMN

ART UNIT

PAPER NUMBER

1797

MAIL DATE

DELIVERY MODE

01/13/2009

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/586,670	Applicant(s) TAKAHASHI ET AL.	
	Examiner N. Bhat	Art Unit 1797	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 November 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-4 and 6-11 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-4 and 6-11 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 20 July 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
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| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>10-4-06, 7-20-06, 11-10-08</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. Applicant's preliminary amendment of July 20, 2006 is acknowledged by the examiner the amendments made to the claims by article 34 amendment have been entered, considered and pending. The examiner further acknowledges that this is a 371 application of PCT/JP2005/00456 filed January 17, 2005 and for purposes for examination, the effective filing date is the 371 date of January 17, 2005.
2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 1-4 and 6-11 are rejected under 35 U.S.C. 102(b) as being anticipated by Takahashi, US Patent 6,228,147.

Takahashi teach a membrane reactor which is depicted in Figure 6, which includes a reaction chamber (1) which is filled with a catalyst (2) and includes a selectively permeable membrane (3). The material gas A is fed from inlet (5) and makes contact with the catalyst, the resulting gas (in this case hydrogen) shown as "X" is transmitted to a hydrogen separation portion Y via the selectively permeable membrane (3), the resulting gas (hydrogen) is then discharged from the chamber via pipe 4. [Note Column 1, lines 52-62] Takahashi further teaches that the membrane reactor comprising a catalyst filled hydrogen formation portion, a

Art Unit: 1797

hydrogen separation portion and a hydrogen selectively permeable portion dividing the two portions wherein the hydrogen formed in the hydrogen formation portion by the reaction of the raw material gas is transmitted to the hydrogen separation portion via the selectively permeable membrane and separated in which the membrane reactor. Takahashi further teach that no partition between the hydrogen formation portion and hydrogen separation can be permitted to merge.[Note Column 3, lines 15-52 and Column 4, lines 4-20]. Takahashi also teach in Figure 1, the membrane reactor which includes raw material introducing section (10) connected with a hydrogen formation portion "X" and steam and /or carbon dioxide "C" introducing section 11 which is connected with a hydrogen separation portion "Y", the catalyst is shown as element (13), there is a catalyst free separation portion "Y" and a selectively permeable membrane (15). The reactor as depicted in the figures is in a tubular arrangement. The reactor as described by Takahashi includes structures which anticipate applicant's claims as drafted. With respect to the claims which recited that the catalyst is bead or pellet shaped, this would be considered to be inherent from reading Takahashi who is teaching a packed bed of catalyst. The membrane is coated or impregnated or includes a Pd-Ag selectively permeably membrane supported on a ceramic porous material in a tubular arrangement as described in Example 1. It is maintained that applicant's invention as presently drafted is anticipated by Takahashi.

4. Claims 1-4 and 6-11 are rejected under 35 U.S.C. 102(e) as being anticipated by Vasileiadis et al, US Patent 6,919,062.

Vasileiadis et al. teach the invention substantially as claimed. Specifically a selectively permeable reactor is include multiple double permeable walled reactors., Vasileiadis et al., teach various arrangements of concentric tubes or tubes in a various arrays which in can include an outer impermeable tube, a next -inner membrane tube made by metal, non-porous or porous inorganic or carbon membrane and most inner membrane tube made by metal, non-

Art Unit: 1797

porous inorganic, carbon or organic membrane.[Note Column 3, lines 33-60 and Column 4, lines 25-44] As stated above, Vasileiadis et al., teach various arrangements and constructions for the permeation of reaction products through membrane tubes, and specifically teaches an a reaction configuration for reforming and producing hydrogen, in Figure 3, the reactor includes an outer impermeable tubular cylinder shell (1), includes are nested two more concentric tubular cylinders (2) and (3) which are made of permeable materials. The outer cylinder is impermeably and is made of stainless steels or alloys thereof. The reactor includes inlets and outlet fittings for feeding reactants and discharging post reaction products, The fittings are made such that there are sealed. Disposed between the space of the concentric membrane tubes can be catalyst which are in pellet or particle form which a packed forming a reaction zone (4) within the reactor.[Note Column 8, lines 28-60] It is maintained that applicant's selectively permeable membrane which includes a catalyst for promoting reaction, a selectively permeable membrane which permits a specific component to pass there through which includes a tubular body which includes a construction where there is a division which separates and divides the catalyst portion from the membrane portion taught by the various tubular constructions of Vasileiadis et al. which include reaction zones as well as selective permeable membrane which permits reaction, heat and mass exchange, and selective separation of products anticipates applicant's invention as presently drafted.

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Kuipers et al. teach a reactor which includes selectively permeable membrane which is used in combination with a catalytic reactor. Gauthier et al. teach staged reactor which includes a membrane after a reaction stage for selective permeation through the membrane. Kusakabe et al. teach a membrane reactor for selectively absorbing constituents from a stream which includes a zeolite membrane including one metal that acts as a catalyst. The zeolite

Art Unit: 1797

membrane is supported on a porous ceramic support and the has a thickness between 0.1 micron and about 50 microns. GB2190397 teach a membrane reactor which separates hydrogen formed in reaction by means of a membrane. Ziaka teach a reactor membrane permreactor for hydrocarbon reforming a water gas shift reactions. There is no partitioning of the catalyst from the membrane separator.

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to N. Bhat whose telephone number is 571-272-1397. The examiner can normally be reached on Monday-Friday, 9:30AM-6:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn Caldarola can be reached on 571-272-1444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/N. Bhat/
Primary Examiner, Art Unit 1797